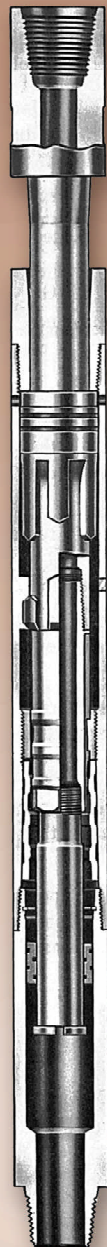


MECHANICAL TYPE J ROTARY JAR

Instruction Manual 4170



Mechanical Type J Rotary Jar

Mechanical Type J Rotary Jar

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The designs and specifications for the tools described in this instruction manual were in effect at the time this manual was approved for printing. National Oilwell Varco, whose policy is one of continuous improvement, reserves the right to discontinue models at any time, or to change designs and specifications without notice or without incurring obligation.

Fifteenth Printing, September 2005

General Description

The **Bowen Mechanical Type J Rotary Jar** is installed in a fishing string to enable the operator to strike heavy upward blows against a fish. It is also installed as a safety device in strings during testing, coring, reaming, drilling, sidetracking and washing over operations to free the string should it stick.

Sealed Bowen Type J Rotary Jars are adjustable straight pull mechanical type Rotary Jars of which the proven working parts operate in a bath of oil. Their torque free operation eliminates the tendency to accidentally release the fishing tools, as well as rig floor hazards. The oil bath insures long life of the tool with a minimum of servicing and a constant tripping tonnage regardless of the hole conditions or rate of operation.

Use

The Bowen Mechanical Type J Rotary Jar is used in Fishing operations, located immediately above the fishing tool. It is also very useful in coring operations to assure that cores are cleanly broken.

The Mechanical Type J Rotary Jar is frequently used in deep, hot holes. In the event that extreme temperatures and pressures cause loss of seals, the Type J Jar will continue to function long afterward, since the tools functioning ability does not depend on the tool being sealed.

The Bowen Mechanical Rotary Jar is used in any operation where the ability to deliver a forceful upward blow may become necessary.

Construction

The Type J Bowen Mechanical Rotary Jar is essentially an expansion joint with a limited longitudinal stroke. The inner or Main Mandrel Assembly and the outer or Bowl Assembly have interlocking splines for the transmission of torque and are packed off with Seals for the Transmission of circulating fluid.

The Jar is filled with oil and sealed top and bottom to prevent the entry of well fluids. Since all parts work in a sealed oil bath, service life of these parts is greatly extended. Presence of sand or oil in the well fluid has no effect on the tripping tonnage, which can be varied only by the operator.

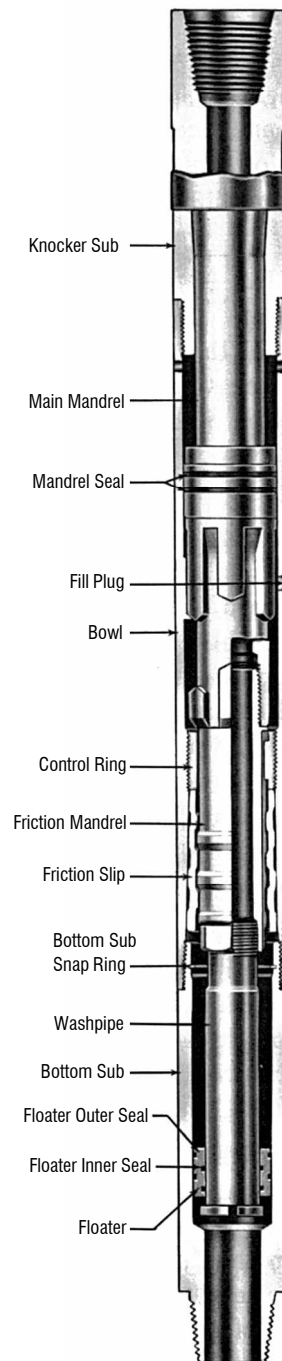
A Floater automatically moves up or down the Washpipe, maintaining a pressure balance within the Jar and eliminating excessive pressures on the Seals.

An unusually large circulating hole is provided in order to pass large volumes of fluid in coring or washing over operations and to pass free point indicators and string shots in fishing operations.

Explanation of Mechanism Tripping Mechanism

The Friction Mandrel projects through the Control Ring which is threaded into the Bowl and when the Jar is in its closed position the Friction Mandrel also projects through the Friction Slip which is located within the taper in the Bowl.

When the Jar is being opened or tripped, the Friction Mandrel pulls the Friction Slip into a reduced section of the taper in the Bowl and against the bottom of the Control Ring. Hence, depending upon the position of the Control Ring, only a slight pull or a pull of many tons is required to open the Jar.



Mechanical Type J Rotary Jar

When the Jar is in the hole and a straight upward pull is exerted against it, the Friction Slip frictions upon the enclosed Friction Mandrel and arrests upward movement while the drill pipe is being stretched. When the upward pull reaches the preset tripping tonnage, the Friction Mandrel is pulled through the Friction Slip. The upward surge of the drill pipe in returning to its normal length causes a sudden separation of the Main Mandrel and Bowl assemblies and the shoulder on the Main Mandrel strikes solidly against the lower face of the Knockers Sub producing a heavy upward blow.

When the Jar is being closed the Friction Mandrel pushes the Friction Slip into the enlarged section of the taper in the Bowl and then slides easily through it. Hence, the Jar can be closed by the application of slightly more than its own weight.

Adjusting Mechanism

When the Jar is in a certain partially closed position, the Bowl Splines are opposite staggered gaps in the Main Mandrel Splines. When the Jar is in this position, the Main Mandrel can be rotated either a sixth of a turn to the right or a sixth of a turn to the left in relation to the Bowl. The Control Ring is joined to the Bowl with a left hand thread and it has an integral key that projects into a keyway in the Friction Mandrel which is screwed into the Main Mandrel. With this arrangement, any right hand rotation of the Main Mandrel in relation to the Bowl will screw the Control Ring up the Bowl and after the Jar has been closed a greater pull will be required to trip it. This results because the Friction Slip will now be pulled into a more reduced section of the taper in the Bowl. It follows that any left hand rotation of the Main Mandrel in relation to the Bowl will screw the Control Ring down the Bowl, and after the Jar

has been closed a lesser pull will be required to open or trip it. This results because the Friction Slip will now operate in a more enlarged section of the taper in the Bowl.

Operation

First, check the Type J Jar to assure that it is properly assembled, and that all its parts are in good working condition. Refer to the illustration on page 5.

Since the stretch of the running drill pipe provides the force to strike the blow, and since the force of the blow is increased as the pull on the drill pipe is increased, additional weight should be located immediately above the Jar. Accordingly, it is common practice to locate from three to fifteen drill collars immediately above the Jar. The greater the number of drill collars used above the Jar, the more effective will be the blow delivered.

Location of Jar in the String

The best location of the Jar in the running string should be determined by the operating conditions, and the job to be performed. The following are usually recommended:

For Fishing

Locate the Jar immediately above the fishing tool, and as close to the fish stuck-point as possible.

For Testing

Locate the Jar immediately above the test tool.

For Coring or Reaming

Locate the Jar one drill collar above the coring tool or reamer.

For Drilling

Locate the Jar immediately above the area where a "close-in" could occur to stick the drill pipe or bit.

For Sidetracking

Locate the Jar so that it is close above the whipstock at all times.

For Washing Over

Locate the Jar immediately above the washover string.

To Jar

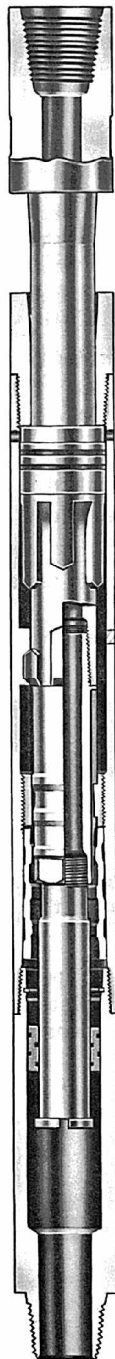
1. Elevate the running string until the initial blow is struck.
2. Lower the running string until it loses weight, indicating that the Jar has re-engaged.

Repeat the above steps for as long as is necessary.

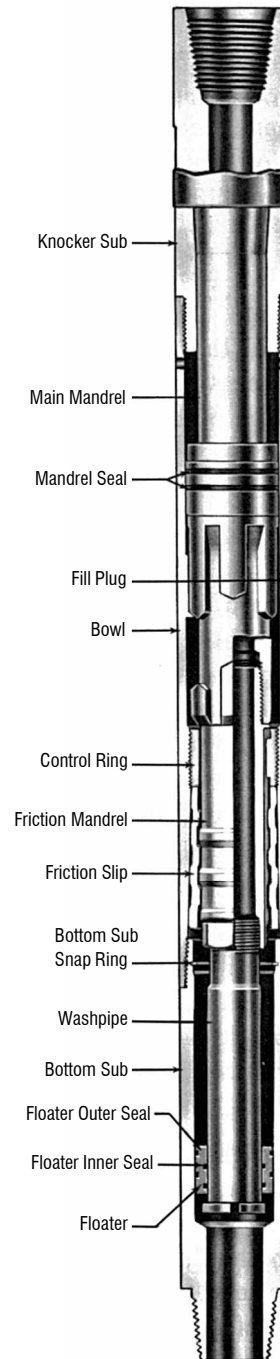
To Increase Jarring Blows

1. Elevate the running string until the blow has been struck.
2. Rotate the running string one-third of a turn to the right.
3. Engage the table dog.
4. Lower the running string until loss of weight indicates that the Jar has re-engaged.
5. Remove the table dog, and allow all excess torque to slack out of the running string.
6. Continue Jarring and increasing the blow by steps 1 thru 5 above, until the Jar is delivering blows of desired intensity.

NOTE: In sticky formations or very deep or crooked holes it may be necessary to rotate the string more than one-third of a turn to transmit the necessary torque required to adjust the mechanism. One way to find the torque required in each particular hole is by rotating the string in increasing amounts and releasing it until at least one-sixth of a turn even if excessive torque is placed in the string. Always allow excess torque to rotate out of the string before jarring operation is continued.



Sealed Type J Rotary Jar
in Open Position



Sealed Type J Rotary Jar
in Closed Position

To Decrease Jarring Blows

To decrease the Jarring blows, follow the procedure for increasing Jarring blows above, but use left hand torque.

Precautions

1. Never put the tongs on the Main Mandrel. This mandrel has a finished sealing surface, which must not be marred.
2. Never strike Jarring blows while torque is in the running string.

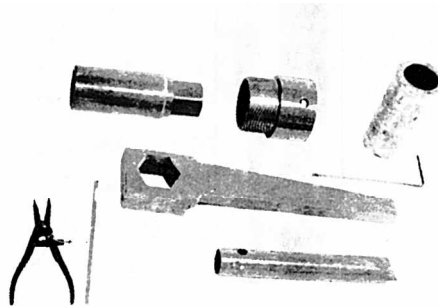
Maintenance

The working parts of the Type J Jar are sealed in oil to reduce wear and frequency of complete servicing. After each normal use, a service inspection should be made to assure that all working parts are still functioning properly, and that the oil bath is intact and not contaminated. After service inspection, rust preventative measures should be taken, after which the Jar may be stored for its next use.

To assure trouble-free operation of the Jar following severe and abusive service, and after five or six routine jobs, the Jar should be completely serviced.

To accommodate the differing circumstances, servicing procedures are outlined below in three classifications:

1. Service Inspection
To be performed after each use.
2. Replacing Seals
To be performed only if oil is found to be contaminated or depleted in the Service Inspection.
3. Complete Servicing
To be performed after any severe or abusive use, or after five or six routine jobs.



Servicing Tools for
Sealed Type J Rotary Jar

1. Service Inspection

- A. Remove the Fill Plug and check the condition of the oil. If the oil is not contaminated, replace any lost fluid and the Fill Plug.
- B. If it is necessary to replace the oil, follow the instructions listed for Complete Servicing, section 3. below.
- C. Place the Jar in a Jar Tester and trip the Jar several times. Set the desired tripping tonnage.
- D. Take the necessary rust preventative measures outlined on page 8.

2. Replacing Seals

Replacement of seals is necessary when leakage is evident or when the oil is found to be contaminated.

To replace the seals, perform all operations listed under Complete Servicing, except omit operations F, G, I, M, P, Q, R, S, T, and U.

3. Complete Servicing

Complete servicing should proceed as follows:

- A. Pull the Jar to the open position.
- B. Clamp the Jar in a vise, and place an open container below the Knocker Sub. Break the Knocker Sub connection and allow the oil to run out of the tool.

- C. Using the Washpipe Wrench or a piece of flat stock, unscrew the Washpipe from the Friction Mandrel. The Washpipe may be temporarily left in the Bottom Sub. See Figure 1.

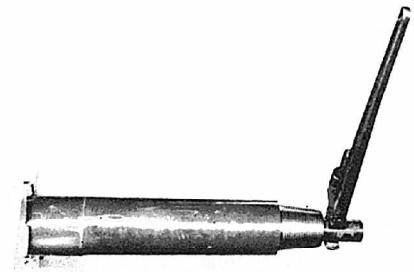


Figure 1

- D. Unscrew the Bottom Sub from the Bowl, and remove the Friction Slip. See Figure 2.

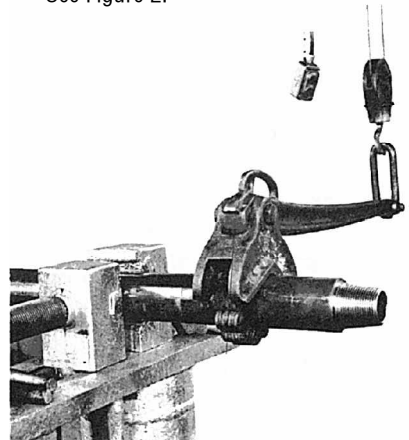


Figure 2

- E. With the snap ring pliers, remove the Bottom Sub Snap Ring. Slide the Washpipe and Floater out the upper end of the Bottom Sub. See Figure 3.
- F. With the jar in the closed position and using the Hex Wrench, Socket Wrench and Centering Guide, unscrew the Friction Mandrel and Control Ring from the Main Mandrel. The Control Ring is keyed to the Friction Mandrel and they will unscrew simultaneously.



Figure 3

G. Slide the Friction Mandrel and Control Ring out of the Bowl.

H. Remove the Main Mandrel from the Bowl.

I. Remove the oil seals from the Main Mandrel and Floater. See Figures 4 and 5.



Figure 4

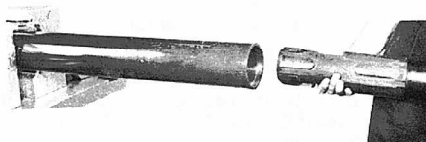


Figure 5

J. Check the splines in the Bowl and on the Mandrel for indications of advanced wear or damage.

K. Remove the Fill Plug and Vent Plug.

L. Thoroughly clean and carefully check each part for any evidence of advanced wear or damage.

To reassemble the Jar, proceed as follows:

M. Insert new oil seals on the Main Mandrel and insert the Main Mandrel into the Bowl.

N. Screw the Knocker Sub into the Bowl and tighten it.

O. Install the Control Ring on the Friction Mandrel, and with the Jar in the closed position and using the Hex Wrench, Socket Wrench and Centering Guide, screw this sub-assembly into the lower end of the Main Mandrel.

NOTE: These are left-hand threads, and if care is taken to assure that the Control Ring is held at the end of its slot, they may be screwed in simultaneously. To insure shouldering the Friction Mandrel, use a sledge hammer on the handle of the Hex Wrench.

P. Place the Setting Gage against the Control Ring, in the Bowl taper.

Q. While holding the Setting Gage firmly against the Control Ring, turn the Main Mandrel to the right until the Setting Gage seats in the Bowl.

NOTE: Because of the construction of the splined area of the Main Mandrel, it will be necessary to move the Main Mandrel in and out, in order to rotate it.

R. Rotate Main Mandrel in opposite direction until the Setting Gage just unseats.

S. Remove Setting Gage and install Friction Slip in its place. This setting, with oil lubricant, produces the following pulling tonnages:

5-1/2" and 6-5/8" Jar	15 tons
4-1/2" Jar	12-1/2 tons
3-1/2" Jar	10 tons
2-7/8" Jar	10 tons
2-3/8" Jar	8 tons

T. If the Setting Gage is not available, omit steps P, Q, R, and S, and proceed as follows:

Install the Friction Slip in the Bowl. While holding the Friction Slip firmly against the Control Ring, rotate the Main Mandrel until the distance from the top of the Friction Slip to the end of the Bowl is one-fourth (1/4) inch greater than the length of the pin on the Bottom Sub.

U. Fill the Jar with oil. Use only a low viscosity oil, SAE 10 or equivalent hydraulic or turbine grade. Use the Bowen Filling Stand to fill the Jar. See description and illustration on page 11.

a. With the Bottom Sub Assembly removed, make certain that the Jar is in the closed position and that it is properly installed in the Filling Stand with Top Sub end down.

b. Install the hose valve and hose of the Filling Stand into the fill plug hole.

c. Operating the lever of the Filling Stand, pump oil into the Jar until oil reaches top of Friction Mandrel.

d. Push Floater down Washpipe until threaded end of Washpipe is partially within the Floater.

NOTE: In this position, the Washpipe will be located in its uppermost position within the Bottom Sub and the Floater will be resting on the Bottom Sub Snap Ring. See Figure 6.



Figure 6

e. Install Washpipe-Floater Unit in Bottom Sub and install Bottom Sub Snap Ring.

f. Pick up Bottom Sub Assembly and screw it into the Bowl to shoulder.

g. With Washpipe Wrench, screw in Washpipe and tighten.

h. Operating the lever of the Filling Stand, pump additional oil into the Jar until the Floater is pushed up against the head of the Washpipe.

i. Continue pumping oil until gauge of Filling Stand reads 1,000 lbs. (If there is no leakage, Jar will maintain this pressure.)

j. If the Jar does not hold this pressure, inspect around Knockers Sub and down through the circulation hole in Bottom Sub to see if there are any leaks.

If there is a leak between the Washpipe and the Friction Mandrel, tighten Washpipe.

If there is a leakage around the Floater, replace faulty Floater Seals.

If there is a leak around the Knockers Sub, replace Mandrel seals.

k. Close valve and disconnect union between valve and hose of Filling Stand.

l. Open valve slightly and bleed off excess pressure.

m. Remove Jar from Filling Stand and lay on its side with Hose Valve up.



Figure 7



Figure 8

n. Insert Floater Setting Gage between the Washpipe and the Bottom Sub and push Floater down until proper space interval is reached so Floater Setting Gage can be hooked into the head of the Washpipe. (The Floater Setting Gage is a spacing device that will properly locate the Floater so that it will not contact the head of the Washpipe during operation of the Jar). See Figures 7 and 8.

Performing the operation shown in Figure 7 results in positioning the Floater on the Washpipe as illustrated above.

If a Floater Setting Gage is not available, use a small rod and tap the Floater down until there is one-half inch (1/2") space between the head of the Washpipe and the top of the Floater.

NOTE: In performing either of the above operations, it will be necessary to open the Hose Valve to bleed off excess oil.

o. Remove Floater Setting Gage.

p. Remove Hose Valve and install Fill Plug.

V. Method of filling Jar when Bowen Filling Stand is not available.

a. Make sure Jar is in closed position.

b. Make sure Floater is located at head of Washpipe and that Washpipe-Floater unit is at extreme bottom end of bore of Bottom Sub.

c. Install Bottom Sub Snap Ring.

d. Install Complete Bottom Sub Assembly and Tighten Washpipe.

e. Stand Jar vertically with Bottom Sub end down.

f. Remove both Vent Plug and Fill Plug.

g. Install Street Ell in the Vent Plug hole.

h. Pour oil into upturned Street Ell until oil flows out the Fill Plug hole.

i. Install Fill Plug in Fill Plug hole.

j. Lay Jar on its side with Street Ell up.

k. Insert Floater Setting Gage between the Washpipe and the Bottom Sub and push Floater down until proper space interval is reached so Floater Setting Gage can be hooked into the head of the Washpipe. (The Floater Setting Gage is a spacing device that will properly locate the Floater so that it will not contact the head of the Washpipe during the operation of the Jar). If a Floater Setting Gage is not available, use a small rod and tap the Floater down until there is one-half inch (1/2") space between the head of the Washpipe and the top of the Floater.

NOTE: In performing either of the above operations, the excess oil will flow out through the Street Ell.

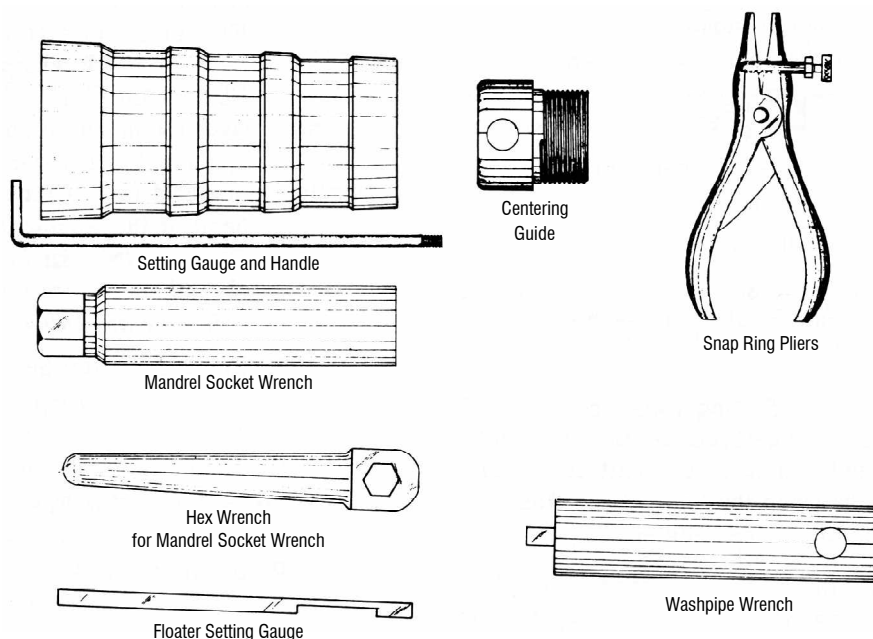
- l. Remove Floater Setting Gage.
 - m. Remove Street Ell.
 - n. Install Vent Plug, and tighten.
- W. Place Jar in Jar Tester and adjust Jar to desired tripping tonnage. See page 10 for instructions for using Jar Tester.
- If Jar Tester is not available and all above instructions have been followed carefully, the assembled Jar is now set at a very low tripping tonnage. See page 7. Thereafter, tripping tonnages can be increased as described under Operating Instructions on page 4 under section entitled "To Increase Jarring Blows."
- X. To prevent rust, close Jar and grease joints and paint exterior surfaces.

Precautions

- A. In servicing procedures make certain that every effort is exerted to prevent scoring the Main Mandrel and Washpipe as their outside diameters are finished surfaces for seals.
- B. If Jar is to be stored, make certain that it is in its closed position.

Setting Tripping Tonnage Using the Bowen Jar Tester

1. Install Jar in Jar Tester.
2. Open Jar by moving Crosshead of Jar Tester toward the Cylinder of the Jar Tester. The maximum reading on the red figures of the Gauge indicated the tons pull required to trip the Jar. No blow is struck but the gauge will show an immediate drop in pressure.
3. To adjust the Jar, close the Jar by moving the Crosshead away from the Cylinder and at intervals stop pumping and apply torque by hand to the Jar Bowl until a position is located where the Jar Bowl will rotate relative to the mandrel.
4. One sixth of a turn of the Jar Bowl to the right will increase the tonnage pull required to trip the Jar approximately two tons. One sixth of a turn of the Jar Bowl to the left decreases the tonnage pull required to trip the Jar approximately two tons. One sixth of a turn of the Jar Bowl is the maximum amount that the bowl can be turned. To increase or decrease the tripping tonnage more than two tons, open the Jar and repeat paragraph 3 above.



Servicing Tools

Filling Stand

This device is used to facilitate filling the Sealed Type J Bowen Rotary Jar. It consists essentially of a Lever to activate the pump, a Stand to hold the Jar, a Tank to hold the oil, and a Hose to convey the oil from the tank through the pump into the Jar.

To Install Jar in Filling Stand

1. Unhook vise chain.
2. Place Jar in Filling Stand with bottom sub end of bowl up.
3. Hook vise chain and tighten Jar in Filling Stand securely.

After the Jar has been securely installed in Filling Stand, the Jar may be filled with oil as described in paragraph V under Section 3, Complete Servicing, on page 6.



Filling Stand

Maximum Field Set Load and Jar Tester Test Load

Assembly Part No.	Jar Size			Max. Field Set Load (lbs)	Jar Tester Test Load (lbs) *	Stroke (inches)
	Connection	O.D. (inches)	I.D. (inches)			
12411	2-3/8 API Reg	3-1/8	5/8	40,000	16,000	6
12422	2-7/8 API Reg	3-3/4	3/4	40,000	20,000	6
12068	2-7/8 API IF	4-1/8	1-1/8	50,000	20,000	6
		4-1/4				
81113	3-1/2 API FH	4-5/8	1-1/2	70,000	20,000	6
		4-3/4				
12431	4-1/2 API Reg	5-1/2	1-1/2	100,000	25,000	6
		6				
81114	4-1/2 API FH	5-3/4	2-1/4	100,000	25,000	6
		6-1/4				
81118	5-1/2 API Reg	6-3/4	3	100,000	30,000	7
81119	6-5/8 API Reg	7-3/4	3	120,000	30,000	7

Maximum Recommended Tightening Torque for Threaded Connections

Assembly Part No.	Jar Size	Knocker Sub to Bowl	Bowl to Bottom Sub	Main Mandrel to Friction Mandrel	Friction Mandrel to Washpipe
12411	3-1/8	2010	2010	600	50
12422	3-3/4	4330	3700	990	55
12068	4-1/8	4525	4525	1565	75
81113	4-5/8	4660	5585	2485	275
	4-3/4	6390	5625	2485	275
12431	5-1/2	11715	11715	3050	200
	6	15045	14685	3745	765
81114	6-1/4	18985	14845	3745	765
	6-1/2	19190	15000	3745	765
81118	6-3/4	13500	13500	5585	575
81119	7-3/4	23825	13400	4055	585

The above makeup torques are the maximum recommended makeup torques for each connection. They are set at 50% of the calculated theoretical yield torque. Torques this high are not required for all fishing jobs, and lower values will result in less wear and tear of the threads. The tightening torque values were calculated assuming Itcolube or similar zinc base grease on all threads and shoulders.

Bowen Mechanical Type J Rotary Jar

Size		2-3/8	2-7/8	2-7/8	3-1/2	4-1/2	4-1/2	5-1/2	6-5/8
		API	API	API	API	API	API	API	API
		Reg.	Reg.	I.F.	F.H.	Reg.	F.H.	Reg.	Reg.
Outside Diameter		3-1/8	3-3/4	4-1/8	4-5/8	5-1/2	5-3/4	6-3/4	7-3/4
Circulation Hole		5/8	3/4	1-1/8	1-1/2	1-1/2	2-1/4	3	3
Stroke		6	6	6	6	6	6	7	7
Complete Assembly	Part No.	12411	12422	12068	81113	12431	81114	81118	81119
(Includes Servicing Tool)	Weight	118	171	233	313	418	460	578	834

Replacement Parts

Main Mandrel	Part No.	12412	12423	12069	81091	12432	81097	81103	81109
(Includes Knocker Sub)	Weight	50	72	103	153	190	214	235	350
Main Mandrel Seal (2 Req'd.)	Part No.	568329	568333	568336	568340	568346	568348	568431	568437
	Weight	1/100	1/50	1/50	1/50	1/50	1/50	1/32	1/32
Knocker Sub (Blank)	Part No.	12413	12424	12070	81092	12433	81098	81104	81110
	Weight	12	18	22	30	40	48	55	68
Bowl	Part No.	12414	12425	12071	81093	12434	81099	81105	81111
	Weight	30	45	57	73	110	102	119	210
Bowl Vent Plug	Part No.	12415	12415	11650	11650	11650	28189	11650	11650
	Weight	1/50	1/50	1/50	1/50	1/50	1/50	1/50	1/50
Bowl Fill Plug	Part No.	12416	12416	11649	11649	11649	11649	12416	12416
	Weight	1/32	1/32	1/32	1/32	1/32	1/32	1/32	1/32
Control Ring	Part No.	1405	115	9277	7520	7520	7266	7282	7282
	Weight	1	1-1/2	2	2	2	3-1/2	6	6
Friction Mandrel	Part No.	1404	114	9278	81094	7519	81100	81106	81106
	Weight	4-1/4	6-1/4	12	16	16	19	35	35
Friction Slip	Part No.	136	116	9279	7382	7382	7134	7283	7283
	Weight	2	3-1/2	5	6	6	15	21	21
Washpipe	Part No.	12417	12426	12072	81095	12435	81101	81107	81107
	Weight	2	3-1/2	5	7	9	14	18	18
Bottom Sub	Part No.	12418	12427	12073	81096	12436	81102	81108	81112
	Weight	27	37	47	53	80	89	140	183
Bottom Sub Snap Ring	Part No.	12419	12197	12074	12045	9311	11422	9333	9459
	Weight	1/100	1/100	1/100	1/50	1/50	1/50	1/10	1/10
Floater	Part No.	12420	12428	12075	12046	12437	11423	12444	12453
	Weight	1-1/4	1-3/4	2	2-1/2	4-1/2	3	5-1/2	11
Floater Outer Seal (2 Req'd.)	Part No.	568326	568329	568331	568336	568338	568343	568349	568427
	Weight	1/100	1/100	1/50	1/50	1/50	1/50	1/32	1/32
Floater Inner Seal (2 Req'd.)	Part No.	568214	568217	568326	568330	568329	568337	568341	568341
	Weight	1/100	1/100	1/100	1/100	1/100	1/50	1/50	1/50
Bowl Spline Insert	Part No.	—	—	—	9554	—	9576	9624	9620
O-Ring	Part No.	—	—	—	568225	—	568236	568239	568236
O-Ring	Part No.	—	—	—	568241	—	568239	568258	568239
O-Ring	Part No.	—	—	—	568242	—	568249	568236	568258
O-Ring	Part No.	—	—	—	568331	—	568258	—	568259
							(2 Req'd.)		
O-Ring	Part No.	—	—	—	—	—	—	—	568261

How to Order

Specify:

- (1) Name and number of assembly or part
- (2) Size and type of top and bottom connections
- (3) Size and type of thread

RECOMMENDED SPARES:

- (1) 6 Main Mandrel Seal
- (2) 1 Bowl Fill Plug
- (3) 1 Control Ring
- (4) 1 Friction Mandrel
- (5) 1 Friction Slip
- (6) 2 Washpipes
- (7) 2 Bottom Sub Snap Ring
- (8) 1 Floater
- (9) 6 Floater Outer Seal
- (10) 6 Floater Inner Seal

Servicing Tools

Centering Guide	Part No.	12458	9270	12459	12454	9313	12455	12456	12457
	Weight	3	6	6	6	8	10	18	21
Friction Mandrel Socket Wrench	Part No.	144	124	9285	7523	7523	7274	7291	7291
	Weight	6	11	12	12	12	24	29	29
Hex Wrench	Part No.	146	126	126	106	106	106	246	246
	Weight	6	10	10	10	10	10	24	24
Setting Gauge	Part No.	148	4127	9582	7404	7404	7276	7293	7293
	Weight	2	3-1/2	5-1/2	5-1/2	5-1/2	10	13	13
Floater Setting Gauge	Part No.	9258	9258	9258	9258	9258	9258	9258	9258
	Weight	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4
Washpipe Wrench	Part No.	9581	9584	9593	9598	9598	9591	9609	9609
	Weight	4-1/2	6-1/16	8-5/8	12-7/8	12-7/8	35-5/8	17-3/8	17-3/8
Snap Ring Pliers	Part No.	7209	7209	7209	7209	7209	9472	9472	9472
	Weight	1/10	1/10	1/10	1/10	1/10	1/4	1/4	1/4

Accessories - Extra

Lifting Sub	Part No.	142	122	122	59600	102	59602	59592	59593
	Weight	13-1/2	16-7/8	16-7/8	25-3/4	28	28	51	70-3/4
Washpipe Wrench Bar	Part No.	—	—	—	9598-1	—	9591-1	9609-1	9609-1
Washpipe Wrench Body	Part No.	—	—	—	9598-2	—	9591-2	9609-2	9609-2
Thread Lubricant	Part No.	153823							

How to Order

Specify:

- (1) Name and number of assembly or part
- (2) Size and type of top and bottom connections
- (3) Size and type of thread

RECOMMENDED SPARES:

- (1) 6 Main Mandrel Seal
- (2) 1 Bowl Fill Plug
- (3) 1 Control Ring
- (4) 1 Friction Mandrel
- (5) 1 Friction Slip
- (6) 2 Washpipes
- (7) 2 Bottom Sub Snap Ring
- (8) 1 Floater
- (9) 6 Floater Outer Seal
- (10) 6 Floater Inner Seal

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* Denotes Manufacturing and Engineering facilities

Downhole Solutions

Drilling Solutions

Engineering and Project Management Solutions

Lifting and Handling Solutions

Production Solutions

Supply Chain Solutions

Tubular and Corrosion Control Solutions

Well Service and Completion Solutions